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GAS ABSTRACTS

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1. GAS INDUSTRY

Economics of Use of High BTU Gas

Henry, H. M. SOME ECONOMICS ON USE OF A HIGH B.T.U. GAS. Part I. *Gas Age* 100, 15-16, 50, 52 (1947) *July* 24; Part II. ibid, 36-40, 72, 74 (1947) *August* 7; Part III. ibid, 18-22, 68 (1947) *August* 12.

This is a three part article dealing quite extensively with the economics of the use of high B.t.u. oil gas in place of enlarging the generating and distributing capacity for carburetted water gas. The Cambridge Gas Light Company is in process of making a changeover to high B.t.u. gas and the figures given apply to that case. It is expected that the changeover wil provide sufficient additional capacity to permit a vigorous sales campaign for increased use of gas. Many tables of capacity and cost comparisons are given. The Cambridge Gas Light Company reached the conclusion that high B.t.u. gas offered greatly increased capacity at a very low investment cost, slightly lower gas production costs per therm and greater opportunities for future economies than any expansion of carburetted water gas production and distribution facilities. The author recommends similar studies to any company for which such a program is a possibility.

H. R. Batchelder

Oil Product Demand

Wollstadt, P. ANALYSIS SHOWS DEMAND TREND FOR 4 CLASSES OF OIL PRODUCTS. *Natl. Petroleum News.* 39, 32-35 (1947) *September* 10.

According to the forecast made by the Economics Advisory Committee of the Interstate Oil Compact Commission at Great Falls, Montana, the demand for petroleum products in 1947 will be 5,805,000 barrels daily. This is 10% greater than the peak year of 1945. Charts covering total actual domestic and export demand for 1941 through 1946 and the prediction for 1947 show the amount of the demand for each product and the percentage each product represents of the total. The four classes of oil products discussed are gasoline, kerosene, distillate fuel oil and residual fuel oil.

L. Ciboch

Patent Law

Parker, L. T. NEW PATENT LAW AFFECTING GAS INDUSTRY. *Am. Gas J.* 167, 31-33 (1947) *September.*

The laws involving the granting of patents, use of patented inventions and the bases for infringement suits are discussed briefly. Court decisions are cited.

L. Ciboch

2. APPLIANCES

Appliance Changeover

Ray, P. A. BURNER PORT CHART. *Gas* 23, 54-57 (1947) *September.*

A burner port chart and method for employing it for use in converting gas appliances are given. A discussion of this chart also appears in *Butane-Propane News* 9, 39-48 (1947)

March, abstracted in *Gas Abstracts* 3, 55 (1947) *April.*

E. F. Davis

Cleaning Gas Services

Peters, W. C. IMPROVED VACUUM METHOD FOR CLEANING GAS SERVICES. *Gas* 23, 42-43 (1947) *August.*

A brief description of the equipment and method employed in cleaning deposits from gas service lines is given.

E. F. Davis

Radiant Heating

Harris, W. S. RADIANT HEATING AT THE BASEBOARD. *Gas* 23, 50-53 (1947) *September.*

This article discusses the results of tests conducted in the test home of the Institute of Boiler and Radiator Manufacturers to determine the comparative operating characteristics of radiant baseboard and small-tube radiators used in conjunction with a hot water heating system. The major differences were that radiant baseboards produced somewhat warmer floors and left the walls much cleaner than the small tube radiators.

E. F. Davis

Single Point Ignition

Corfield, G. SINGLE POINT IGNITION. *Gas* 23, 44-45 (1947) *August.*

A short discussion of the domestic gas range single point ignition system and the details of its operation is given.

E. F. Davis

Venting of Gas Appliances

COMMON SENSE PRACTICES AND RULES FOR PROPER VENTING OF GAS APPLIANCES. *Am. Gas J.* 167, 11-14, 50 (1947) *September.*

A condensation of the set of rules for venting of gas appliances as issued by the Rocky Mountain Gas Association is given. Illustrations showing the right and wrong methods of venting are shown.

E. F. Davis

The following article, which has not been abstracted, is called to your attention:

Mackay, M. B. HOW TO SIZE HOT WATER SYSTEMS. *LP-Gas* 7, 32, 74-76 (1947) *August.*

3. COMBUSTION AND INDUSTRIAL FURNACES

Combustion of Oil and Gas

Rowley, L. N. and McCabe, J. C. HOW TO FIRE OIL OR GAS WITHOUT SMOKE. *Power* 91, 64-68 (1947) *September.*

A discussion is given of the chemical composition and grading of fuel oils and gases followed by an explanation of the types of burners and the method of combustion of each fuel. In addition, some operating hints are given which will aid in the smokeless firing of fuel oil and gas.

E. F. Davis

Furnace Atmosphere for Sintering

Webber, H. M. and Hotchkiss, A. G. FURNACE ATMOSPHERES FOR SINTERING. III. *Ind. Heating* 14, 1254, 1256, 1258, 1260, 1262, 1264, 1266, 1268, 1270 (1947) *August.*

Methods of removal of sulfur, carbon dioxide, and other undesirable elements in a gas used for sintering are incorporated in readily available furnace atmosphere producing equipment. Sulfur is conveniently removed by scrubbing with water and by passing over iron oxide or wood shavings. A non-decarburizing gas (CO_2 and H_2O free) is obtained by absorption of CO_2 in mono-ethanolamine solution, a solution which is continuously and automatically regenerated, and by the removal of water to a dew point of -40°F. by refrigeration and treatment with activated alumina dryer. It is the authors' opinion that although the CO_2-free dry gas producing unit is of high initial cost, advantages gained such as high purity gas, constant gas composition, and low maintenance cost generally save enough money in a period of five or more years to warrant installation. A modified unit for small scale production of combusted gas for non-decarburizing work passes combustion products of hydrocarbon gas through incandescent charcoal at 1950-2050°F. Flow diagrams and curves showing carburizing action vs. composition of sintering gas are included.

C. Von Fredersdorff

Gas Burner Comparison

Campbell, D. A. CHARACTERISTICS OF BASIC GAS COMBUSTION EQUIPMENT. *Steel* 121, 78-79, 103-104, 106, 108 (1947) *September* 22.

A direct comparison of the operating characteristics of each type of gas burner is given along with a short discussion of gas flow through an orifice, mixture pressure, velocity pressure and rates of flame propagation.

E. F. Davis

Gas and Steam Turbine Comparison

THERMODYNAMICS OF STEAM AND GAS TURBINES COMPARED. *Combustion* 19, 43-45, 47-48 (1947) *August.*

Entropy diagrams of a simple and an extracting-preheating steam turbine cycle, a single and double stage gas turbine cycle and corresponding diagrams showing losses for both cycles are compared and the conclusions drawn substantiate the opinion that: (1) For large power stations steam will continue to be the more economical. (2) Where oil or gas is available, the gas turbine may prove more economical in some cases in capacities up to 10,000 KW. (3) The economic prospects of the gas turbine increase with short running hours, cheap oil or expensive coal, restricted space, scarcity of cooling water, and low atmospheric temperatures.

C. Von Fredersdorff

Gas Turbine

NEW 4800-Hp 1400-F. GAS TURBINE MARKED BY SIMPLICITY OF DESIGN. *Power* 91, 68-70 (1947) *August.*

The first post-war gas turbine to be developed by the General Electric Company is designed for railroad propulsion and may also be applied to industrial power and peak load plants. This gas turbine plant, running at 6700 rpm with 1400°F. turbine-inlet temperature, develops 4800 hp at the shaft. It has only two stages in the turbine, no regenerator and the 15-stage axial-flow compressor raises 70,000 cfm of air through a pressure ratio of 6:1. No intercooling or reheating is used. Overall thermal

efficiency referred to the turbine shaft output is expected to be somewhat above 17%,based on the heating value of bunker C fuel. It is expected that almost any liquid or gas fuel can be used.

J. J. First

Gas Turbine Power Plant

Yellott, J. I. THE GAS TURBINE POWER PLANT — V. *Power Plant Eng.* 51, 113-114, 116, 118, 120, 122 (1947) *July.*

The author presents detailed design calculations and description of the turbine prime mover. Attention is given to impulse and reaction, nozzle velocity, turbine efficiency, blade design and stress, and methods of cooling high temperature zones. Graphs and drawings illustrating the points covered are included.

C. Von Fredersdorff

Gas Turbine Pressure Exchanger

Sidler, P. R. THE COMPREX—A PRESSURE EXCHANGER FOR GAS TURBINES. *Power Plant Eng.* 51, 128, 130 (1947) *July.*

The Comprex is a new type of pressure exchanger developed for use on gas turbines. The name Comprex was coined to denote that this machine compresses air and expands gas in the same rotor. Its function is to form the higher pressure stage between the axial compressor of the gas turbine and the combustion chamber. In its first full scale installation, on a gas turbine power plant for a locomotive, the Comprex increased the output 80% from 2200 to 4000 hp—and improved the efficiency 25%, from 18 to 22.5%. The 4000-hp unit has almost the same diameter as the older one and is only 3 ft. longer.

J. J. First

Industrial Ovens

Litzler, C. A. THE DESIGN OF INDUSTRIAL OVENS WITH SPECIAL REFERENCE TO SAFETY. *Ind. Gas* 26, 9-11, 29-35 (1947) *August.*

Due to great increases in claims for damages from accidents accompanying the tremendous expansion of the oven industry in 1941 to 1946, insurance underwriters with the oven industry and the National Board of Fire underwriters are taking definite steps in establishing overall safety codes to control all industrial oven installations. The main causes of oven accidents in the past and upon which the codes should read are enumerated and discussed by the author, namely; (1) Vapor concentrations in furnace and ducts, (2) Exhaust system, (3) Air heater and burner equipment, (4) Safety controls, and control interlock, (5) Temperature control, (6) Dip tanks and drainboards, (7) Oven contact with building, (8) Structural failure.

C. Von Fredersdorff

Use of Carbon in Blast Furnace

Joseph, T. L. and Neustaetter, K. THE USE OF CARBON IN THE BLAST FURNACE AND HEAT BALANCES. *Blast Furnace & Steel Plant* 35, 824-831 (1947) *July.*

A detailed discussion of the reactions of carbon in the blast furnace, at and above the tuyeres, is presented. Further consideration is given to the composition of gas from tuyere zones and reactions of iron, phosphorus, silicon, and manganese with carbon, carbon monoxide and carbon dioxide. Operating conditions are noted.

C. Von Fredersdorff

Joseph, T. L. and Neustaetter, K. THE USE OF CARBON IN THE BLAST FURNACE AND HEAT BALANCES *Blast Furnace & Steel Plant* 35, 944-948 (1947) *August.*

The authors present a detailed sample heat balance calculated by a new method to show precisely how the carbon entering a blast furnace is utilized and compare the results of their new method of calculation with conventional methods.

C. Von Fredersdorff

4. CARBONIZATION AND GASIFICATION

Coal Preparation

Lessing, R. THE RATIONAL PREPARATION OF COAL. *Fuel* 26, 57-73 (1947) *May-June.*

This article, first presented as a paper at a meeting of the Institute of Fuel in September of 1943, describes the necessity of proper utilization and preparation of coals.

G. M. Platz

Desulfurization

Hoover, C. O. (to Air Reduction Company Inc.) HYDROCARBON PRODUCTS FREE FROM VOLATILE SULFUR COMPOUNDS. *U. S.* 2,423,238 (1947) *July 1.*

A method is given for the recovery of hydrocarbon products free from hydrogen sulfide, mercaptans, and disulfides. Gases containing these compounds are passed upward through a scrubbing column where they are absorbed in a hydrocarbon oil containing up to 10% cuprous naphthenate. Reactions take place converting these volatile sulfur compounds to stable non-volatile compounds which are retained by the oil. The absorbing oil is then passed through a heat exchanger to a heater and a stripping column where the sulfur-free gases are separated.

C. Hummel

Gas Manufacture

Powell, A. R. GAS MANUFACTURE FROM FUELS OTHER THAN COAL. *Gas World* (*British*) 127, 116-121 (1947) *July* 26.

This is an abstract of a paper presented in New York on June 2, 1947, before the Joint Production and Chemical Committee Conference under the title, "Future Possibilities in Methods of Gas Manufacture." Various gas manufacturing processes are considered and it is concluded that gas production processes in the Northeastern quarter of the United States will continue to use bituminous coal and heavy fuel oil. For extreme peaks liquefied petroleum gases will be used. High temperature carbonization of coal will be improved by new by-product recovery methods, increased capacity, higher thermal efficiency and cheaper plant construction. Where natural gas or refinery oil gas is available at a price comparable to fuel oil on a therm basis, reforming in water gas sets is feasible.

C. H. Riesz

Gas Manufacture Trends

Hall, E. L. TODAY AND TOMORROW IN GAS MANUFACTURE. *Gas* 23, 31-34 (1947) *August.*

A discussion of the possible future trends in gas manufacture and of the research in progress under the sponsorship of the Gas Production Research Committee of the American Gas Association is presented.

H. R. Batchelder

Gasification Trends

King, J. G. THE FUTURE OF CARBONIZATION AND GASIFICATION. *Gas World (British)* 127, 162-166 (1947) *August* 2.

A general survey of the prospects for development in the various phases of the gas industry in Great Britain and the United States is presented.

H. R. Batchelder

Plant Reconstruction

LARGE PLANT RECONSTRUCTION AT EAST GREENWICH. *Coke & Gas (British)* 9, 195-201, 211 (1947) *July.*

A description is given of design and reconstruction, including coke-oven battery, wet purification plant, coal-handling equipment, coke handling and screening plant and water gas and producer-gas units.

C. Von Fredersdorff

Storage

Bircher, J. R. STORAGE OF COKE-OVEN GAS IN SANDSTONE STRATA. *Chem. Eng. Propress "Trans. Section"* 43, 453-458 (1947) *September.*

For several years coke oven gas has been stored in exhausted wells in the McKeesport gas field. In order to prevent fouling of the sand by gum deposits the gas is cooled and cleaned, compressed to 125 psi, then passed through Cottrell precipitators. The gum joined by this treatment is removed by oil scrubbing and the gas passed to storage. Operations have been very successful; no gas losses have been encountered here.

H. R. Batchelder

Water Gas Tars

DEHYDRATION OF WATER GAS TARS. *Am. Gas Assoc. Monthly* 29, 389-390 (1947) *September.*

Excerpts from a Progress Report from Pennsylvania State College on the study of water gas tars are given. Tar emulsions and dehydrated tars stored at temperatures of 150° and 200°F. increase appreciably in viscosity. Work is being done on the recovery and concentration of oils and resin forming materials from water gas tars.

H. R. Batchelder

5. NATURAL GAS AND NATURAL GAS CONDENSATES

Condensate Production and Cycling

Jones, P. L. CONDENSATE PRODUCTION AND CYCLING. Part 3. *World Oil* 126, 32-34 (1947) *August* 25.

The displacement of in-place gas by injected gas is discussed.

J. D. Parent

Jones, P. J. CONDENSATE PRODUCTION AND CYCLING. Part 4. *World Oil* 127, 32-34 (1947) *September* 1.

The basic data of Part 3 on the unit injection circle and the break-through pattern for one well part are applied in this article. A procedure for estimating an invasion pattern relative to boundaries and interference between wells is derived and illustrated graphically for sym-

metric and asymmetric conditions in reservoirs. Invasion patterns are used to locate producing and injection wells. The more advantageous locations are those for which the break-through invasion factor is greater for a reservoir as a whole.

Excerpt from article
J. D. Parent—Reviewer

Jones, P. J. CONDENSATE PRODUCTION AND CYCLING. Part 5. CONDENSATE RECOVERY FOR SEVERAL INTERVALS. *World Oil* 127, 40, 42, 44 (1947) *September* 8.

This is the fifth in a series of articles dealing with condensate recovery. The economic limit of cycling for condensate recovery is considered in this article for the case of a single well completed in several intervals.

J. D. Parent

Jones, P. J. CONDENSATE PRODUCTION AND CYCLING. Part 6. CONDENSATE RECOVERY FOR SEVERAL WELLS. *World Oil* 127, 52, 55-56, 58 (1947) *September* 15.

A procedure is presented for mapping cycling programs.

J. D. Parent

Cycling Operations Model Studies

Marshall, D. L. and Oliver, L. R. SOME USES AND LIMITATIONS OF MODEL STUDIES IN CYCLING PATTERNS. *Petroleum Technology* 10, T.P.-2230 (1947) *July.*

The use of model studies in cycling operations is illustrated. It has proven to be of great aid in developing invasion patterns of injected gas and thereby affords the opportunity to design a pattern which will provide maximum recovery of liquid products.

J. D. Parent

Dually Completed Wells

Williams, N. CHICAGO CORPORATION SUCCESSFULLY PERFORMS REMEDIAL WORK ON DUALLY COMPLETED WELLS. *Oil Gas J.* 46, 101, 102, 105 (1947) *September* 13.

Details are presented for some novel remedial work on dually completed wells.

J. D. Parent

Economics of Cycling

Woods, W. H. ECONOMICS OF CYCLING. *Oil Gas J.* 46, 99, 101, 104-105 (1947) *August* 23.

Economic factors involved in cycling are presented. Methods of calculating loss due to retrograde condensation and their inaccuracies are indicated.

J. D. Parent

Gas-Transmission Project

Parks, P. LAKIN-DINNER GAS-TRANSMISSION PROJECT SCHEDULED FOR EARLY COMPLETION. *Oil Gas J.* 46, 209-210, 213 (1947) *September* 20.

Some data on Colorado Interstate's new 20 in. line from the Hugoton field to Denver are presented. Ultimate capacity is to be 236 MMcf/day. Compressor discharge pressure is to be 710 psi.

J. D. Parent

LP-Gas Metering

Smith, R. S. ACCURATE METERING OF BUTANE AND PROPANE. *Butane Propane News* 9, 67-75 (1947) *September.*

This article gives a detailed description of a proper method of metering LP-gases being pumped to the customer's tank. The essential change is the use of a back pressure regulator after the meter; vents are provided for vapor removal before the meter. This method still does not account for vapor returned to the delivery tank directly from the customer's tank when using a vapor return.

E. F. Davis

LP-Gas Meters

Sieger, W. H. TESTING LIQUID METERS. *LP-Gas* 7, 37, 85-87 (1947) *September.*

This article stresses the need for a standard method of testing LP-gas meters. The author advocates that the meter be tested with gasoline, that vapor return lines should not be used in filling the customer's system, but instead that a pump with a high pressure delivery should be used. He does not state how the tank pressure should be relieved after filling.

E. F. Davis

Peak Shaving

Barry, J. S. PEAK SHAVING WITH PROPANE-AIR. *Gas* 23, 27-30 (1947) *August.*

An account of the installation of the Dedham and Hyde Park Gas Company which operated very successfully last winter is given. By means of vaporizers and Selas mixers, and manual control of the amount used, 800 B.t.u. propane-air, up to 43% of the carburetted water gas sent out, was added with a minimum of customer complaints. The carburetted water gas was used to inspirate and mix the propane-air. The final mixture at the maximum dilution had a heating value of 660 B.t.u. and specific gravity of 0.91.

H. R. Batchelder

Peak Shaving

Larson, D. B. MIXING OIL GAS WITH BUTANE. *Gas* 23, 58-59 (1947) *September.*

A resumé of the experience with butane-air used for peak load shaving at Portland during 1946-1947 is given. It was found that up to 40% butane-air could be used. In general it was felt that in view of the infrequent use and lack of experience the performance was very creditable.

H. R. Batchelder

Peak Shaving

EXPANSION OF PEAK-LOAD PROPANE-AIR GAS PLANT. *Am. Gas J.* 167, 31-33 (1947) *August.*

The installation at Brooklyn Union Gas Company which can provide up to 500 MCF per hour of 540 B.t.u. gas for 120 hours is described. L.P. gas is delivered in tank cars carried on barges, six to a barge, and pumped to 1,425,000 gal. tanks. Five gas-air machines are installed. Fourteen additional storage tanks are being installed and a 15 million cu. ft. waterless holder provides storage.

H. R. Batchelder

Propane-Air Gas

Jamison, E. A. and Lambeck, T. J. HEATING

VALUE SELECTION OF PROPANE-AIR GAS. *Gas Age* 100, 21-24 (1947) *September* 4.

The factors that bear on the choice of heating value when changing to propane-air are discussed. These cover: present and future adequacy of distribution system; operating pressures and anticipated low temperatures; unaccounted for losses; methods of mixing air and propane; storage facilities.

H. R. Batchelder

Propane Recovery

Chambers, R. E. FACTORS IN GASOLINE PLANT DESIGN FOR HIGH PROPANE RECOVERY. *Petroleum Processing* 2, 664-668 (1947) *September.*

Where net propane recovery of 70-80% is desired in natural gasoline plant operations, new plant design requires either additional or larger equipment, as compared with earlier installations. Additional dehydration and refrigeration equipment will operate to condense all the light vapors down to the deethanizer and there effect a closer separation of ethane from propane. Additional size equipment will include larger absorber, still and fractionators for recycling to separate the ethane into absorber residue gas. Illustrations are given of the use of the new processes for increased propane recovery for plants handling both low and high pressure gases. Variable factors in absorber operations are given and the series of possible fractionations discussed. The functions of refrigeration and dehydration in propane recovery operations are described.

Author's abstract

Reconversion Program

Carney, B. R. SHAMROCK COMPLETES RECONVERSION PROGRAM. *Oil Gas J.* 46, 56-60, 63 (1947) *August* 30.

A flow sheet for Shamrock's revised process is presented. Improvement in natural gasoline and LP-gas is a feature. Liquid phase phosphate treatment and vapor phase de-sulfurization are employed.

J. D. Parent

Power from Natural Gas

NATURAL GAS PRESSURE PROVIDES POWER IN THE SOUTHWEST. *Southern Power and Ind.* 65, 64-66 (1947) *August.*

At the Columbian Carbon Company's new plant at Hickok, Kansas, natural gas is used to drive expansion turbines. Natural gas received from several wells is throttled to 300 psi, scrubbed clean of oil and dirt, preheated to 550°F. to overcome the difficulties of ice and hydrate formation, passed through four Elliott gas turbines where it is expanded to 20 psig and 400°F. in turn generating 440 v, 3 phase, 60 cycle electrical current. The discharge gases from the turbines are used to produce carbon black. The electrical power produced is used for electrical precipitation, lighting, and motors in the plant and for lighting and power in employees' homes. Overall efficiency for turbines is 55 to 60 per cent.

E. Strong

Transmission

Miller, B. GAS TRANSPORTATION SYSTEM CALCULATIONS. PART X. *Gas Age* 100, 23-24, 33-34 (1947) *August* 21.

A method of calculating flow in parallel lines of different diameters is given.

J. D. Parent

Miller, B. GAS TRANSPORTATION SYSTEM CALCULATIONS. PART XI. *Gas Age* **100**, 37-40 (1947) *September* 4.

Some elementary material on laminar flow is presented.

J. D. Parent

Underground Storage

Dahlgren, E. G. and Farrar, L. D. MOTHER EARTH'S STORAGE TANKS. *Public Utilities Fortnightly* **40**, 346-353 (1947) *September* 11.

This is a non-technical resumé on present underground storage practice.

J. D. Parent

6. PETROLEUM AND SYNTHETIC LIQUID FUELS

Catalytic Cracking

Good, G. M., Voge, H. H. and Greensfelder, B. S. CATALYTIC CRACKING OF PURE HYDROCARBONS. CRACKING OF STRUCTURAL ISOMERS. *Ind. Eng. Chem.* **39**, 1032-1036 (1947) *August.*

This paper is the sixth in a series devoted to the study of the catalytic cracking of pure hydrocarbons; the present paper investigates the cracking of structural isomers. Cracking rates can be correlated with carbon atom groupings of the isomers. In particular, the presence of a tertiary carbon atom in paraffins, naphthenes and alkyl groups attached to aromatic rings, has an accelerating influence upon the rate of cracking. Presence of quaternary carbons has an opposite effect.

C. H. Riesz

Catalytic Cracking Mechanism

Hansford, R. C. A MECHANISM OF CATALYTIC CRACKING. *Ind. Eng. Chem.* **39**, 849-852 (1947) *July.*

The author proposes a mechanism for the catalytic cracking of hydrocarbons in the presence of silica-alumina type catalysts, basing the theory on the acceptance of protons from the hydrocarbon by adsorbed water and on the donations of protons to the hydrocarbon by the catalyst. The fact that water-deficient catalysts exhibit low cracking activity and that deuterium oxide adsorbed on catalysts readily exchanges deuterium for hydrogen in adsorbed hydrocarbons at low temperatures seems to substantiate the mechanism. A description of apparatus used, results of cracking of n-butane, and equations illustrating the proposed mechanism are given.

C. Von Fredersdorff

Catalytic Cracking Unit

Kelso, G., Peavy, C. C., Myers, G. D. and Hodge, A. W. DESIGN AND OPERATION OF A SMALL-SCALE THERMOFOR CATALYTIC CRACKING UNIT. *Petroleum Refiner* **26**, 93-103 (1947) *August.*

A thermal cracking plant of Leonard Refineries, Inc., at Alma, Michigan, was adapted to treat a reduced Michigan crude by means of the thermofor catalytic cracking (TCC) process. The catalytic reactor and regeneration kiln supplanted the reaction chamber of the thermal

plant, existing auxiliaries being utilized in the revised unit. For the reactor charge rate of 3000 barrels of oil per day, 75 tons per hour of catalyst were circulated (volumetric catalyst to oil ratio was 4.5 approximately). Costs for constructing installations of the type described is estimated at $250 to $300 per daily barrel of reactor charge capacity.

C. H. Riesz

Fischer-Tropsch Synthesis

Hall, C. C. and Smith, S. L. HYDROCARBON SYNTHESIS IN THE PRESENCE OF COBALT CATALYSTS AT MEDIUM PRESSURES. *J. Inst. Petroleum* 33, 439-459 (1947) *July.*

The paper describes experimental work carried out by the Fuel Research Board during the period 1941 to 1944 on hydrocarbon synthesis at medium pressure (150 lbs. per sq. in.). The catalyst used was cobalt-thoria-magnesia-kieselguhr which had been particularly effective at atmospheric pressure. With synthesis gas (H_2:CO = 2:1) purified from sulfur compounds, conversion to liquid and solid hydrocarbons was 10% greater and the rate of catalyst deterioration was 30 to 50% less than under comparable conditions at atmospheric pressure. Hydrogen treatment and re-reduction at high temperature did not prolong catalyst life, which was of the order of six months. The most efficient conversion to liquid and solid hydrocarbons occurred with gas of H_2:CO ratio of about 1.5:1. With water gas (H_2:CO = 1.2:1) catalysts of high cobalt content could be effectively employed to obtain increased production of higher hydrocarbons per unit of catalyst volume at medium pressure (roughly 40%). Gaseous hydrocarbon formation was extensively suppressed under these conditions while the olefin content of a light gasoline fraction was increased from 8 to 53%.

C. H. Riesz

Fischer-Tropsch Synthesis

THE IRON CATALYST IN THE FISCHER-TROPSCH SYNTHESIS. Part I. *Coke & Gas* (British) 9, 125-127 (1947) *May;* Part II. ibid, 165-167 (1947) *June.*

The information in iron catalysts contained in B.I.O.S. Report 447, C.I.O.S. Report XXXI-23 and F.I.A.T. Reports 276 and 426 is reviewed. Work on iron catalysts in Germany was necessitated by the shortage of cobalt. Fischer and other scientists at Kaiser Wilhelm Institute (K.W.I.) were of the opinion that cobalt was the best catalyst for commercial use. In 1942-1943 the government sponsored tests of iron catalysts submitted by six groups. While conditions for the tests were specified precisely, the objectives were not so stated and no definite conclusion could be made. The K.W.I. catalyst gave the highest overall yield of hydrocarbons; its composition was 0.5-1 % alkali, 2-3% copper, remainder ferrous iron. The best Lurgi catalyst had the composition = 100 Fe, 25 Cu, 9 Al_2O_3, 2 K_2O, 30 SiO_2. In the tests it was not operated at its best conditions which would have given large yields of wax. The Braunkohle-Benzin company used a catalyst containing = 100 Fe, 80-90 Cu, 80-90 Zn. I.G. Farbenindustrie submitted a catalyst which was believed to be sintered iron pellets made by the reduction at 800-850°C. of iron carbonyl pasted with concentrated alkali. This catalyst was next best to the K.W.I. in most respects. I.G. apparently had concentrated upon unconventional lines in hope of producing a new and patentable process; details of some of these methods are given. Ruhrchemie developed a catalyst of composition as follows = 100 Fe, 5 Cu, 10 CaO, 30 kieselguhr. Ruhrchemie had a large pilot plant which was one-tenth full scale; the use of low density catalysts was stressed by this company. The Rheinpreussen catalyst probably had the composition = 100 Fe, 5 Cu, 120 $CaCO_3$. It appeared to have operational difficulties in the tests. Lurgi Gesellschaft fur Warmetechnik also submitted a catalyst for the tests; their work had been concentrated in developing a recycle process.

C. H. Riesz

Sulfur in Petroleum

Haines, W. E., Wenger, W. J., Helm, R. V. and Ball, J. S. SULFUR IN PETROLEUM. *U.S. Bureau Mines Report of Investigations* 4060, 1-36 (1946) *December.*

For the purpose of compiling information on sulfur compounds in petroleum products the Bureau of Mines, working in cooperation with the University of Wyoming, investigated the literature for sources and properties of various organic sulfur compounds. The compounds studied are broadly classified as: (1) thiols, (2) disulfides, (3) sulfides, and (4) thiophenes. The nomenclature and physical constants of many of the compounds comprising these groups are given.

H. Hakewill

Thiophene Detoxification

Maxted, E. B. STUDIES IN THE DETOXIFICATION OF CATALYST POISONS. Part V. THIOPHEN. *J. Chem. Soc. (British)* 1947 624-627 *(May).*

This fifth paper in a series of studies on the detoxification of catalyst poisons deals with thiophene. The procedure consists in converting thiophene successively to thiophane (by hydrogenation) and then to thiophane sulfone (by oxidation), the toxic sulfur atom being thereby shielded by the two oxygen atoms. Platinum black was used as the hydrogenation catalyst while permolybdic or perphosphoric acid in hydrogen peroxide was used to perform the oxidation. Complete detoxification was reached in the systems studied although repeated detoxification treatments were required when relatively high thiophene concentrations were encountered.

C. H. Riesz

7. ANALYTICAL METHODS AND TESTS

Carbon Dioxide Determination

Roberts, E. J. COMBINED ABSORPTION AND TITRATION TUBE FOR VOLUMETRIC DETERMINATION OF CARBON DIOXIDE. *Anal. Chem.* 19, 616 (1947) *August.*

The superiority claimed for this method is that a large volume of wash water and a large excess of alkali are unnecessary. Standard sodium hydroxide solution and carbon dioxide-free distilled water are put into the absorption tube to which the carbon dioxide generator is connected through a wash tube. Carbon dioxide-free air is passed through the apparatus throughout the determination. At the completion of the reaction excess barium chloride is added, and the solution is stirred in the absorption tube while the excess alkali is titrated to the phenolphthalein end point. A diagram of the apparatus and a summary of results are given.

C. Hummel

Infrared Absorption Analysis

Quarendon, R. INFRA-RED ABSORPTION ANALYSIS OF GASES AND VAPOURS. Part I. GENERAL INTRODUCTION. *Petroleum (British)* 10, 54-55, 57 (1947) *March.*

This article is the first of a series of six articles describing the principles of infra-red spectroscopy in somewhat elementary language. The theory of infra-red absorption is discussed qualitatively, and the principle of its detection is described.

S. Katz

Quarendon, R. INFRA-RED ABSORPTION ANALYSIS OF GASES AND VAPOURS. Part 2. GENERAL FEATURES OF LIMITED RADIATION ANALYZERS. *Petroleum (British)* **10**, 78-79, 89 (1947) *April.*

The second article in this series discusses briefly and in very general terms the components of an infra-red spectrometer. There are the radiation source, the absorption cell, the dispersing medium, the detector and the device for measuring the output.

S. Katz

Quarendon, R. INFRA-RED ABSORPTION ANALYSIS OF GASES AND VAPOURS. Part 3. COMMERCIAL INSTRUMENTS. *Petroleum (British)* **10**, 106-108, 113 (1947) *May.*

The third article in the series describes a number of commercial instruments, including the well-known Beckman and Perkin-Elmer infra-red spectrometers and an English and a German model.

S. Katz

Quarendon, R. INFRA-RED ABSORPTION ANALYSIS OF GASES AND VAPOURS. Part 4. THE TECHNIQUE OF LIMITED RADIATION ANALYSIS. *Petroleum (British)* **10**, 159-160 (1947) *July.*

Analytical techniques are discussed in the fourth article in the series. Calibration of the instrument is described, and the application of the Beer-Lambert law to analysis is given. Procedures are outlined for situations where the law is inoperative.

S. Katz

Mass Spectrometer

Deegan, C. J. THE MASS SPECTROMETER AND WHAT IT DOES. *Oil Gas J.* **46**, 64, 91 (1947) *September* 6.

A brief non-technical discussion of the principles of the mass spectrometer is given with the aid of analogies drawn from everyday experience. Applications and advantages of the instrument are cited and illustrated with examples of typical results.

H. Hakewill

Moisture in Coal

Belcher, R. and Spooner, C. E. THE DETERMINATION OF MOISTURE IN COAL. *Fuel (British)* **26**, 55-56 (1947) *May-June.*

A rapid direct method for determining moisture in coal is described. In carrying out the procedure the coal is heated for 15 minutes at 110°C. in a current of oxygen-free, dry nitrogen and the expelled moisture is absorbed by Anhydrone and weighed. Results obtained by this method yielded slightly higher values than found by the conventional loss of weight test performed in an oven. Evidence is given showing that this discrepancy is caused by adsorption of gases on the surface of the dried coal. It is claimed that this direct method for moisture determination is more reliable than the various forms of indirect measurement generally employed.

H. Hakewill

Particle Size Analysis

McCabe, R. P. A SURVEY OF PARTICLE SIZE METHODS. *Ceramic Age* **50**, 155-157, 190 (1947) *September.*

A brief survey of methods of size analysis for powders is presented. Type of information ob-

tainable and range of application are given for each method mentioned.

J. D. Parent

The following article, which has not been abstracted, is called to your attention.

THE MASS SPECTROMETER IN GAS ANALYSIS. *Gas Age* 100, 35, 46 (1947) *August* 7.

8. GENERAL AND PHYSICAL CHEMISTRY

Azeotropes

Horsley, L. H. TABLE OF AZEOTROPES AND NONAZEOTROPES. *Anal. Chem.* 19, 508-600 (1947) *August;* Britton, E. C., Nutting, H. S. and Horsley, L. H. VAPOR-LIQUID EQUILIBRIUM DIAGRAMS OF ALCOHOL-KETONE AZEOTROPES AS FUNCTION OF PRESSURE. ibid., 601-602; Nutting, H. S. and Horsley, L. H. GRAPHICAL METHOD FOR PREDICTING EFFECT OF PRESSURE ON AZEOTROPIC SYSTEMS. ibid., 602-603; Horsley, L. H. GRAPHICAL METHOD FOR PREDICTING AZEOTROPISM AND EFFECT OF PRESSURE ON AZEOTROPIC CONSTANTS. ibid., 603-609.

Most valuable data on azeotropes is presented by Horsley et al. in a series of four articles. The effect of pressure is also treated.

J. D. Parent

Azeotropic Entrainers

Berg, L. and Harrison, J. M. EVALUATION OF AZEOTROPIC ENTRAINERS. *Chem. Eng. Progress "Trans. Section"* 43, 487-496 (1947) *September.*

Separation by azeotropic distillation of a standard mixture of methylcyclohexane-toluene was investigated using as entrainers the homologous series of lower aliphatic alcohols. The per cent of toluene of a given purity recovered was determined at various reflux ratios and correlated with the amount of material necessary to be handled (column size), heat requirements, and nature of the entrainer. It is shown that azeotropic distillation is not always capable of improving the purity obtainable by nonazeotropic rectification. Effectiveness of an entrainer varies with the degree of product purity desired and the reflux ratio used, as well as with the isomeric nature of the entrainer itself. Some few entrainers will yield a greater amount of product of a given purity by handling a smaller amount of material and with a lower heat input requirement than will straight distillation.

Author's abstract

Compressibility

Joffe, J. COMPRESSIBILITIES OF GAS MIXTURES. *Ind. Eng. Chem.* 39, 837-838 (1947) *July.*

Several different methods of evaluating pseudo-critical constants of gaseous mixtures to be used in conjunction with generalized compressibility charts are presented.

J. D. Parent

Heat Capacities

Wacker, P. F., Chaney, R. K. and Scott, R. B.

HEAT CAPACITIES OF GASEOUS OXYGEN, ISOBUTANE AND 1-BUTENE FROM −30° TO +90°C. *J. Research Natl. Bur. Standards* 38, 651-659 (1947) *June.*

The heat capacities of gaseous oxygen, isobutane and 1-butene were determined with an adiabatic flow calorimeter between −30° and +90°C. A description of the apparatus and procedure is given. The accuracy of the apparatus used was tested by determining the heat capacities of oxygen at −30°, + 40° and + 90°C. and comparing the values obtained with those determined from spectroscopic data. Agreement within 0.04, 0.02 and 0.11% was obtained. By assuming no significant differences between the relative accuracies of the data obtained for oxygen, isobutane and 1-butene, the estimated probable error in the determined heat capacities of the hydrocarbons was shown to be roughly 0.07%.

R. Husch

Infrared Absorption Spectrum of Carbon Disulfide

Plyler, E. K. and Humphreys, C. J. INFRARED ABSORPTION SPECTRUM OF CARBON DISULFIDE. *J. Research Natl. Bur. Standards* 39, 59-65 (1947) *July.*

The infrared absorption spectrum of carbon disulfide was measured in the liquid and vapor phase. The liquid structure is given between 2 and 24 *u* and the spectrum of the vapor between 3 and 15 *u*. The band structure confirms the observation of other workers that carbon disulfide is a symmetrical linear molecule. It is pointed out that at higher wave lengths thin layers of carbon disulfide are quite transparent and that it should prove very suitable as a solvent in the study of compounds in this region.

S. Katz

Latent Heat of Vaporization

Macleod, D. B. THE CALCULATIONS OF THE LATENT HEAT OF VAPORIZATION AND THE VISCOSITY OF CO_2 UNDER PRESSURE ON THE BASIS OF A REVISED EQUATION OF STATE. *Trans. Faraday Soc.* 43, 169-172 (1947) *April.*

The author has proposed a revised form of the equation of state which is a variation of van der Waals' equation. The latent heat of vaporization of CO_2 and its viscosity under pressure have been computed, employing the constants of the equation without the introduction of any arbitrary terms. The calculated values are in moderately good agreement with experimental data.

S. Katz

9. ORGANIC CHEMISTRY

Chemicals from Petroleum and Natural Gas

Egloff, G. CHEMICALS FROM PETROLEUM AND NATURAL GAS. *Oil Gas J.* 46, 88, 93, 95-97 (1947) *August* 30.

The manufacture of chemicals from petroleum and natural gas is reviewed. Total production of petrochemicals in 1946 was 3,800,000,000 lbs. Benzene, toluene, xylene and other aromatics, not included in the above figure, amounted to 1,800,000,000 lbs.

C. H. Riesz

Toluene Synthesis

Given, P. H. and Hammick, D. L. SOME CATALYZED GAS-PHASE REACTIONS OF

AROMATIC HYDROCARBONS. Part I. THE INTERACTION OF BENZENE WITH METHYL ETHER. *J. Chem. Soc.* (*British*) 1947 928-935 *(July)*.

The interaction of methyl ether with benzene to form toluene took place in the presence of metal oxide catalysts at 450-500°C. Synthetic alumina-silica (20-80 by wt.) was the most effective and under optimum conditions, 12-15 mole % of benzene was formed per pass. In contrast to Friedel-Crafts reactions, the monomethyl derivative predominated.

C. H. Riesz

10. CHEMICAL ENGINEERING

Distillation of Natural Gasoline

Lockhart, F. J. MULTI-COLUMN DISTILLATION OF NATURAL GASOLINE. *Petroleum Engr.* 18, 111, 113, 116, 118 (1947) *August.* See *Gas Abstracts* 3, 136 (1947) *August* for abstract.

Fluid Flow Formulas

Miller, B. PIPE-LINE FLOW FORMULAS. *Oil Gas J.* 46, 174-175, 256 (1947) *September* 20.

This article provides an introduction to fluid flow theory, particularly laminar flow in circular pipes.

J. D. Parent

Fractional Distillation and Absorption

Edmister, W. C. HYDROCARBON ABSORPTION AND FRACTIONATION PROCESS DESIGN METHODS. Part 4. *Petroleum Engr.* 18, 49-54, 56, 58 (1947) *August.*

A rather detailed presentation of flash vaporization calculations is given.

J. D. Parent

Fractionating Column

Pierce, W. R. RELATIONSHIP OF REFLUX TO FEED FOR A FRACTIONATING COLUMN. *Petroleum Refiner* 26, 92-97 (1947) *September.*

Three types of reflux ratios have been mentioned in the literature: (1) the fundamental or the ratio of the mols of liquid descending to the mols of vapor rising, (2) the ratio of liquid descending to the overhead product, and (3) the ratio of liquid descending to the feed. The first two of these have been widely discussed in the literature, however, to the author's knowledge, no publication concerning the latter ratio has ever appeared. The author made some calculations for binary mixtures using the McCabe-Thiele method for a variety of conditions and checked the results with those obtained by the Brown-Martin and Gilliland methods. He concluded that the ratio of liquid descending to feed is fixed for a given separation and number of plates regardless of the feed composition. He felt that this function is not especially useful.

J. D. Parent

Gas Absorption

Johnstone, H. F. and Silcox, H. E. GAS ABSORPTION AND HUMIDIFICATION IN CY-

CLONE SPRAY TOWERS. *Ind. Eng. Chem.* 39, 808-817 (1947) *July.*

Measurements were made in a model cyclone tower on the rates of absorption of sulfur dioxide by alkaline solutions and on humidification of the gas. The effect of entrance design, gas and liquor velocities, and nozzle spacing are correlated in such a manner that the performance of large towers can be predicted. The towers provide high rates of absorption as well as good efficiency for the removal of finely divided dust particles. They may be operated over a wide range of conditions and loading ratios of liquid to gas. Their simplicity and low pressure losses should make them useful in the chemical industry for treating large quantities of gases.

Authors' abstract

Heat Transfer

Leva, M. HEAT TRANSFER TO GASES THROUGH PACKED TUBES. *Ind. Eng. Chem.* 39, 857- 862 (1947) *July.*

A dimensionally homogeneous equation has been developed which permits the prediction of heat transfer coefficients to gases flowing through tubes packed with low thermal conductivity material. The equation gives satisfactory results for ratios of D_p/D_t varying from about 0.05 to 0.3. (Gas Abstracts reviewer's comment: where D_p and D_t denote particle and tube diameter respectively.) The equation predicts a maximum coefficient of heat transfer for a ratio of $D_p/D_t=0.15$, and this finding was verified by experimental evidence. The equation may be used to calculate coefficients for gases other than air as long as the Prandtl group of those gases does not differ materially from that of air and carbon dioxide. The inclusion of the Prandtl group in general is thoroughly discussed. Experimental evidence is presented to show that the equation holds for tube sizes varying from ½ to 3 inches in diameter. Over this range the agreement is good, and the application to larger tube sizes is discussed. The effect of voids in the packing was studied with great care, and no coordinated relation seems to exist between voids and heat transfer coeffcients.

Author's abstract

Heat Transfer

Parmelee, G. V. and Huebscher, R. G. HEAT TRANSFER BY FORCED CONVECTION ALONG A SMOOTH FLAT SURFACE. *Heating, Piping, & Air Conditioning* 19, 115-118 (1947) *August.*

This is a report of an investigation of forced convection heat transfer from a flat surface to air when laminar and transition boundary layer flows exist along the surface. Essentially the apparatus consisted of an electrically heated plate suspended in the center of a rectangular wind tunnel. Air velocities varied from 3 to 60 ft. per sec. Principal data obtained during the investigation are given. These data were used to evaluate dimensionless numbers, which were correlated to represent the flow conditions and the heat transfer process. Complete details of this study and the study of turbulent boundary layer flow will be published in an ASHVE Research Bulletin. This will include the authors' correlations and comparison of data from several sources.

W. M. Dow

High Vacuum Technology

Morse, R. S. HIGH VACUUM TECHNOLOGY. *Ind. Eng. Chem.* 39, 1064-1071 (1947) *September.*

The present status of high vacuum technology is reviewed, with pictures of recently developed equipment and process plants which employ pressures in the micron range. Discussion is

limited to industrial applications of vacuum techniques at 10^{-5} to 10^{-1} mm. in such fields as dehydration, metallurgy, distillation, metal evaporation, etc. Operating data on large diffusion pumps, gages, and steam ejectors are given with respective limitations. Large scale operations are mentioned from the point of view of design and construction to illustrate the fact that, in so far as technical problems of high vacuum per se are concerned, operations of any scale are now feasible.

Author's abstract

Slip Flow

Carman, P. C. SLIP FLOW IN GRANULAR BEDS. *Nature* **160**, 301-302 (1947) *August* 30.

The relation of the Kozeny and Poiseuille equations is demonstrated. Using Millikan's correction for slip at capillary walls the Kozeny equation is modified. An equation for molecular flow is obtained from the more general modified expression.

J. D. Parent

11. PROCESS EQUIPMENT AND INSTRUMENTATION

Fractionationg Column

Hall, H. J. and Jonach, F. L. PRECISE LABORATORY FRACTIONATING COLUMN. *Petroleum Refiner* **26**, 92-97 (1947) *August* 26.

A still has been designed and built for the separation of complex hydrocarbon mixtures required for subsequent analysis. The still has a capacity of 200 ml; the average time required for a complete run, including an acetone wash and drying out period, is about 43 hours. The column is packed with 3/64" Fenske helices, has an operating holdup of 8 ml. and a boilup rate of 150 ml. per hr. Pressure drop at the flooding point is about 2.5 mm. of mercury with a paraffinic charge or 4.5 mm. with an aromatic. On a test with n-heptane-methyl cyclohexane the theoretical efficiency of the column reaches 80 plates and levels out in 3 to 4 hrs. of total reflux. In operation the separation is enough to show enrichment of C_8 isoparaffins boiling as little as 0.6°F. apart. Routine distillations of hydrocarbons boiling as high as 380°F. have been conducted without column heating. Adiabatic conditions are maintained by a shielded vacuum jacket, containing a layer of aluminum foil supported directly on the outside of the distilling tube. Details of construction and assembly, as well as tables of separations obtained and enrichment ratios are given.

M. Nolt

Heat Pump Installations

Penrod, E. B. A REVIEW OF SOME HEAT-PUMP INSTALLATIONS. *Mech. Eng.* **69**, 639-647 (1947) *August.*

A discussion of 22 heat pump installations with a report on the operation of each is given. The average coefficient of performance (COP) for these installations is 3.4, and it is believed with improved efficiencies of electric motors and compressors that the COP can be increased with a resulting decrease in operating cost. An excellent bibliography is given.

E. F. Davis

Locating Defects

Carlin, B. LOCATING INTERNAL DE-

FECTS. *Am. Gas Assoc. Monthly* 29, 391-393 (1947) *September.*

This article presents the principles of operation and description of the Supersonic Reflectoscope which is used to locate flaws in plant equipment by the reflection of high frequency vibrational waves from a discontinuity in the material being tested. The instrument is nondestructive of equipment and locates defects as deep as 25 ft.

J. J. First

12. MATERIALS OF CONSTRUCTION

Cathodic Protection

Frink, J. CATHODIC PROTECTION OF UNDERGROUND SYSTEMS. *Am. Gas J.* 167, 27-29 (1947) *September.*

The fundamentals of corrosion are explained in terms of the electrochemical series and the galvanic cell. Two types of corrosion found in the underground pipelines are the electrolytic and the galvanic. Methods of accumulation of the data necessary before applying any protection against corrosion, and a brief description of the different types of cathodic protection are described in this article.

S. Mori

Corrosion

Gow, J. T. A SURVEY OF HIGH-TEMPERATURE, GAS-ATMOSPHERE CORROSION OF IRON-NICKEL-CHROMIUM ALLOYS. PART I. *Corrosion* 3, 311-324 (1947) *July.*

A representative summary is presented of physical and chemical properties of "stainless" steels and their behavior at high temperatures under the influence of nitrogen, carbon dioxide, carbon monoxide, hydrocarbons, and hydrogen sulfide. The effect of small amounts of minor elements such as carbon, silicon and manganese as regards strength and corrosion resistance is considered. Phase diagrams of alloyed metals and creep and rupture characteristics are plotted.

C. Von Fredersdorff

Gow, J. T. A SURVEY OF HIGH-TEMPERATURE GAS-ATMOSPHERE CORROSION OF IRON-NICKEL-CHROMIUM ALLOYS. Part II. *Corrosion* 3, 383-405 (1947) *August.*

The corrosive effect of different compositions of Fe-Cr-Ni alloys under various conditions between temperatures of 1600 to 2200°F. was studied. The Ni content was varied from 0 to 70% and the Cr from 11 to 31%. Uninterrupted and interrupted with tumbling tests were made under air atmosphere. Oxidizing, reducing, and variable sulfur content flue gas atmospheres were also used to test different alloys. Included in this article are a ternary Fe, Ni, Cr diagram showing the weight of metal lost for different alloys for both air and flue gas tests, a graph showing the maximum satisfactory temperature for different alloys in flue gas atmosphere, and magnified photographs of subsurface corrosion that accompanied scaling. A general discussion on the merits of the weight loss of metal over the weight gained due to oxide formation in measuring corrosive effect, interdependence of all the elements in the alloy upon one another and their minimum requirements needed to prevent corrosion, effect of adding foreign metals into the Fe-Ni, or Cr alloy, process of diffusion of metallic ions and the formation of stratification of oxide films on the scale is given.

S. Mori

Corrosion

Rohrman, F. A. CORROSION STUDIES FOR THE PETROLEUM REFINING INDUSTRY. Part 3. *Petroleum Refiner* **26**, 109-113 (1947) *August.*

This is the last of a series of articles on corrosion in the petroleum refining industry written by F. A. Rohrman, and it deals with corrosion tests. Field tests are the most logical and simple method of determining corrosion but they are handicapped by the time element. The author believes that the accelerated tests are the most desirable if the composition of the corroding medium and the conditions affecting it are under control, the data are accurately collected, and the results are interpreted carefully. Application and interpretation of these tests should be done by a well experienced person because it is easy to draw fallacious conclusions from the data. There are eleven methods of preventing or retarding corrosion as listed in this article. Each method is accompanied by specific examples.

S. Mori

Pipe Protection Determination

Huddleston, W. E. THE DETERMINATION OF PIPE PROTECTION BY THE CONTINUOUS POLARITY METHOD. *Corrosion* **3**, 325-330 (1947) *July.*

By locating the exact position where the polarity in the circuit on a cathodic protected pipeline becomes discontinuous, the point of discharge of the protective current into the soil may be found. A rough approximation of this point may be obtained by measuring the IR drop readings, but the final location is obtained with an electron detector. Then the soil surrounding the leakage is removed, and the IR drop again measured as a check. The leakage is usually from voids due to the skidded area on the pipes during installation, and can easily be remedied by reapplying the coating mixture and the wrapping on the void.

S. Mori

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